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PENNSYLVANIA GEOLOGICAL SURVEY
Harrisburg, Penna.

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FIELD TRIP
GUIDE
CORNWALL IRON MINE
Lebanon County

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF INTERNAL AFFAIRS
Genevieve Blatt, *Secretary*



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ITINERARY

Distance	Mileage	
0.0	0.0	Assemble in parking area around Central Dauphin High School.
1.0	1.0	Proceed on Locust Lane beyond Route 230 underpass. Turn right. <u>Stop</u> before entering dual highway (Route 230 By-pass).
0.1	1.1	Turn right on Route 230 By-pass.
2.8	3.9	<u>Stop</u> for red light. Turn left on Route 322 - 422.
7.7	11.6	Turn right. Follow Route 322. <u>Stop sign.</u> Proceed straight ahead.
1.5	13.1	Hershey
2.9	16.0	Lebanon County Line
		The route of the trip lies entirely in the Great Valley physiographic province, underlain by Cambrian and Ordovician limestones. The hills on the south are underlain mostly by Triassic sandstones and conglomerates. To the north occasional glimpses can be had of the slightly higher Harrisburg peneplane underlain by the Martinsburg shales. On clear days, Blue Mountain, supported by Tuscarora quartzite, can be seen on the northern side of the valley. Its flat crest is a remnant of the Schooley peneplane.

Distance	Mileage	
1.3	17.3	Entering Campbelltown.
0.4	17.7	Straight ahead, cross Route 117. Leaving Campbelltown.
0.7	18.4	Roadcut exposing diabase dikes cutting Cambrian limestone. In this low cut at least four thin diabase dikes are exposed. The rocks are somewhat weathered.
1.7	20.1	Village of Mt. Pleasant. Excellent view of valley to the north.
1.2	21.3	Village of Fontana.
3.2	24.5	Entering Quentin.
1.2	25.7	Entering Cornwall, <u>bear left</u> at intersection.
0.4	26.1	Cornwall. <u>Stop sign</u> . Bear right, follow Route 322. <u>Caution</u> as you approach railroad tracks.
0.5	26.6	Observation point for the Cornwall Iron Mine. Bus will pull off of the road and park on the right.

CORNWALL IRON MINES

Location - The Cornwall Iron Mines are located on both sides of Highway Route U. S. 322 about one-half mile south of the village of Cornwall. Cornwall

is six miles south of Lebanon, 30 miles east of Harrisburg.

Geologically, the deposits are located at the northern edge of the Triassic basin, where Cambrian limestones come in contact with a diabase intrusive of Triassic age. There are two ore bodies being mined. The western orebody has been worked from the surface and underground while the eastern is an entirely underground operation.

History - The iron ore mines at Cornwall are the oldest continuously operated mines in the Western Hemisphere. Iron ore is reported to have been discovered here by Peter Grubb in 1732. The magnetite ore cropped out on three hills: Big Hill, Middle Hill and Grassy Hill. In 1742 a furnace was built near the deposits, and the ore has been worked continuously since that time. Through the first century or more of operation, ownership was very diverse, but in 1864 the Cornwall Ore Banks Company was formed consolidating 95 of the 96 holdings. In 1916 to 1921 Bethlehem Steel Company gradually acquired ownership of the Cornwall Ore Banks Company. In 1926 it purchased the Robesonia Iron Company and for the first time the ownership of the entire area was in the hands of a single corporation.

The eastern orebody was not discovered until 1919, when it was located by dip needle survey. Its discovery, however, had been forecast by Spencer (1908) who said, "All of this ground (from Miners Village) as far as the road leading from Rexmont to Overlook is regarded as likely to contain a continuation of the Cornwall ore bed".

The western orebody was worked entirely by open pit methods until 1921, when an inclined shaft was sunk near the western end of the open pit. Underground mining by sublevel stoping and shrinkage stoping was carried out in the deeper parts of the orebody until 1940. From 1940 to 1953 operation was by open pit only. In 1953 underground mining was resumed as all of the ore that could be won by open pit methods had been removed.

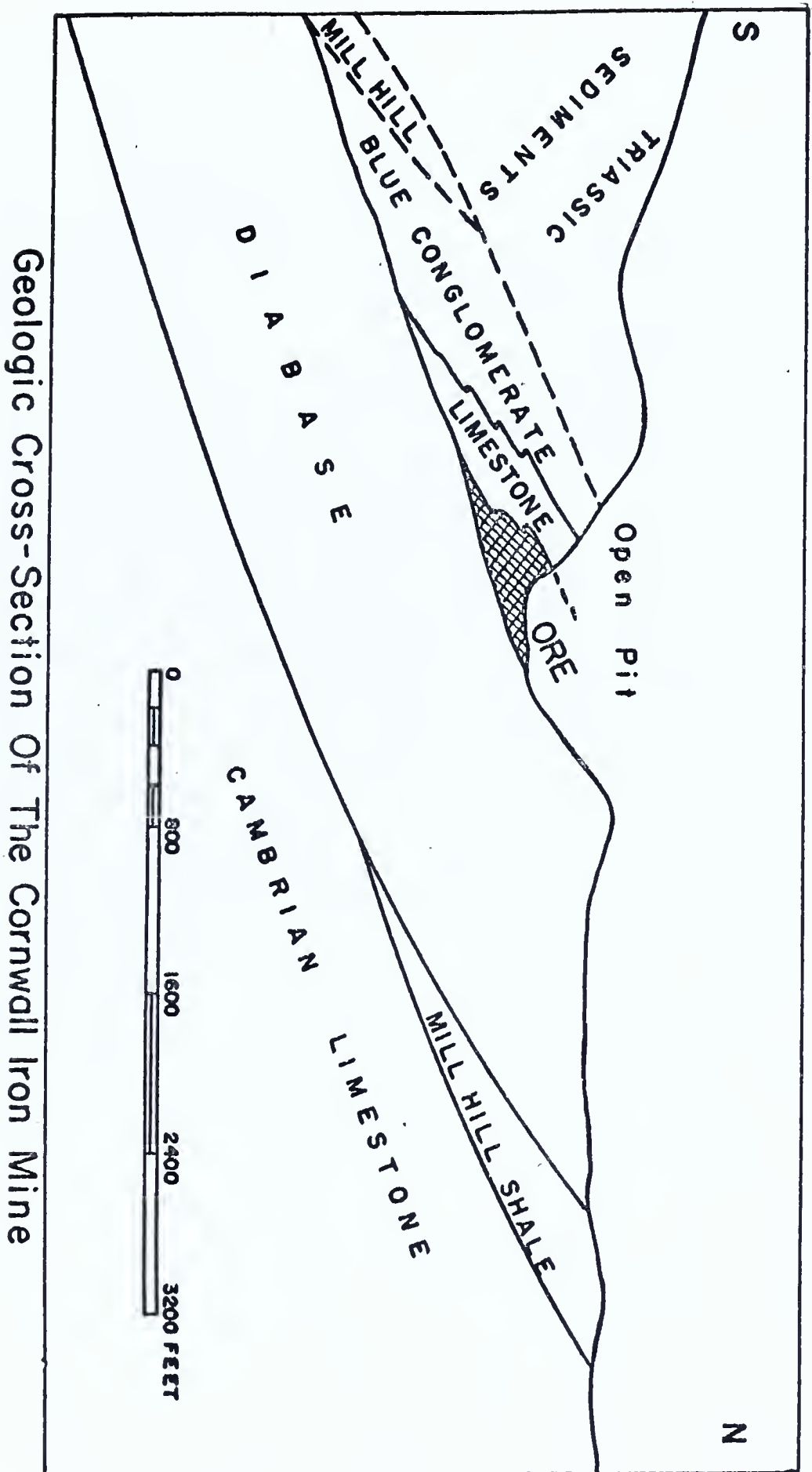
Two inclined shafts were sunk in the footwall of the eastern orebody in 1927 and 1928. Development in this orebody was halted due to the depression in 1931 before any significant ore had been produced. Mining was resumed in 1937. Mining is by panel caving, a modification of block caving.

Iron was the only metal recovered until shortly after 1920. The pyrite in the ore contains about one percent of cobalt, and until recently Cornwall was the leading domestic producer of cobalt. Sulphur (sulphuric acid) is recovered in the roasting of the pyrite. Gold and silver in appreciable quantities (1700 oz. of Au in 1953) are derived from the refining of the copper. At present the mine is producing five metals and one non-metal. In addition, the limestone overburden removed from the pit is being crushed and sold for aggregate. The present production is around one million tons of ore per year. The grade of the ore averages 40-42% Fe. The magnetic concentrates contain about 62% Fe.

Geology - Geologically, the deposit is a contact metasomatic deposit at the

contact of a Triassic diabase sheet and Cambrian limestones. The intrusive in the vicinity of the ore is a dike, here about 1000 feet thick and dipping 40-45°S. at the surface. This dike is part of a basin-shaped sheet, in part cross-cutting, and in part concordant, which has an elliptical outcrop pattern three by six miles. On its northern edge the sheet follows approximately the contact between the Triassic sediments and the Paleozoic sediments of the Great Valley. At Cornwall a wedge of the Paleozoic sediments lies above the dike and this wedge contains the major ore bodies.

Mineralogy - The minerals found at Cornwall are associated with two major rock types: diabase and limestone. Diabase is an igneous rock of dark green color containing feldspars and pyroxenes, with minor amounts of biotite and hornblende. The diabase formed by the crystallization of these minerals from a hot solution which cut upward through the surrounding limestone. This diabase as it cooled and solidified, recrystallized some of the limestone into marble. Several minerals, such as diopside, actinolite, vesuvianite, and garnet also formed in the limestone, partly as a result of the heat, and partly as a result of the addition of some chemical elements from the diabase solutions. Later, additional solutions spread outward from the top of the diabase into the limestone. The magnetite, hematite, pyrite, chalcoppyrite, chalcocite, covellite, and chlorite formed at this stage. Sometimes they replaced the limestone, and sometimes they replaced the previously formed diopside and actinolite. The zeolites, sulfates, and copper carbonates crystallized last, filling in open fractures and cavities. The consequence of this series of geologic events has resulted in certain minerals being found together. Three such examples are the associations 1) magnetite-chalcoppyrite-actinolite, 2) zeolites-chlorite-magnetite, and 3) garnet-tremolite-calcite-serpentine.



Geologic Cross-Section Of The Cornwall Iron Mine

